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(71) Applicant

Potain Poclain Materiel (P P M) (France),
Zone Industrielle de la Saule, 71304 Montceau-Lea-
Mines, France

(72) Inventor

Bernard Meussu

(74) Agent and/or Address for Service

J Miller & Co,
Lincoln House, 296-302 High Holborn, London
WC1V 7JH

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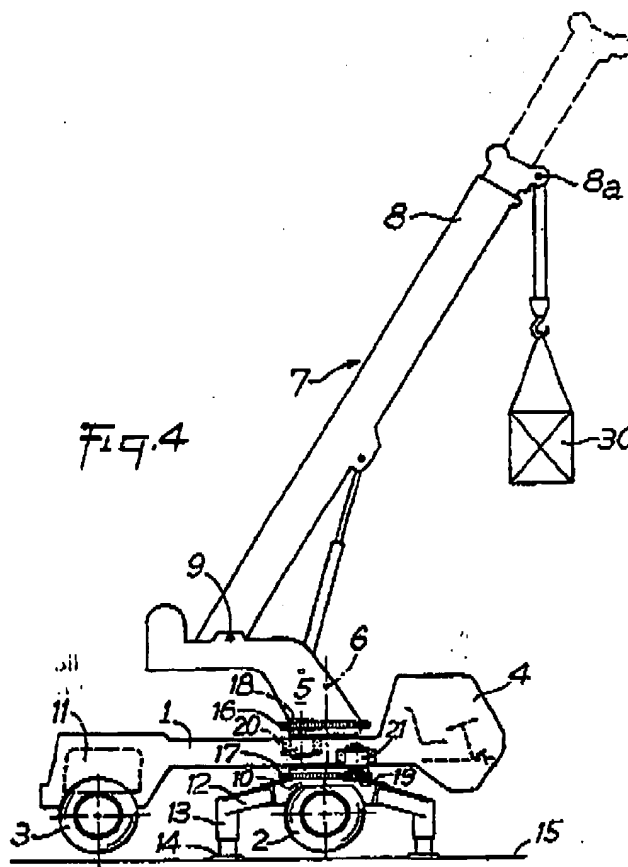
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(58) Field of search

B8H

(54) Mobile machine, such as a
mobile crane or excavator,
equipped with turret structure
and stabilizing assembly

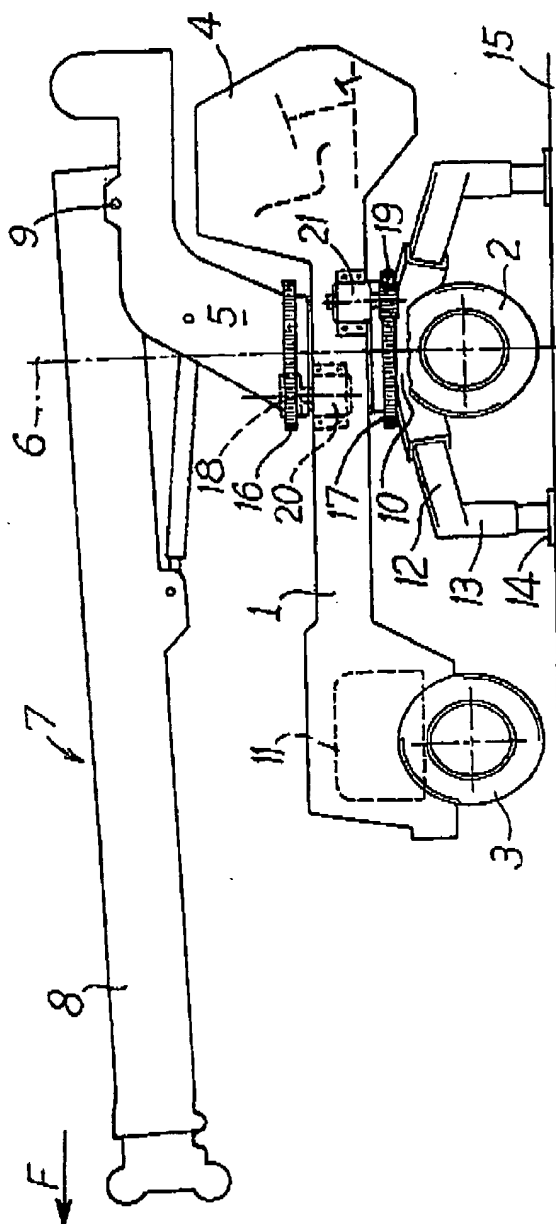
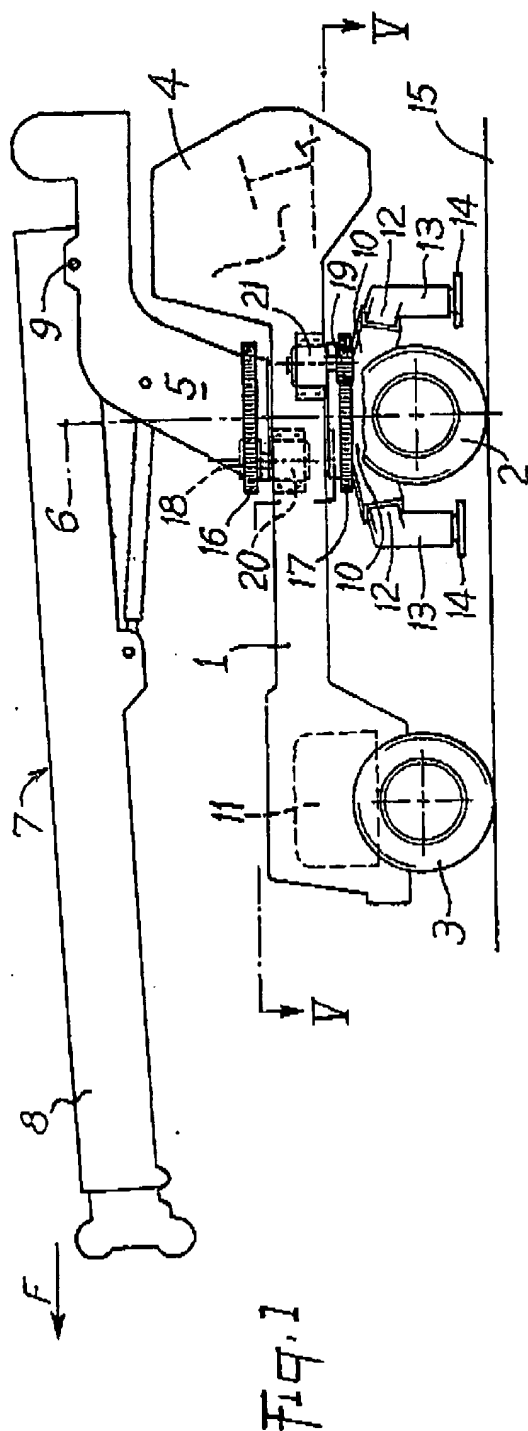
(57) A mobile machine comprises a chassis 1, a driver's cab 4 and a turret 5 situated on the chassis 1, a working equipment 7 comprising a boom 8, mounted on the turret 5, a driving assembly 11 mounted on the chassis 1 and a stabilizing assembly 12, 13, 14 mounted on a lower turret structure 10 for rotating with respect to the chassis 1 and means of selectively connecting the turret 5 with the chassis 1 to immobilize the turret 5 with respect to the chassis 1. For road travel the turret 5 is pinned to the chassis 1 along the longitudinal axis of the chassis 1 with the boom 8 substantially horizontal and overhanging the driving assembly 11. As shown the boom 8 has been brought to an operating position for use as a crane by unpinning the turret 5, rotating the turret 180° about axis 6 and repinning. With wheels 2, 3 off the ground the boom 8 can be slewed by lower turret structure 10, the driving assembly 11 remaining in line with the boom and acting as a counterweight.



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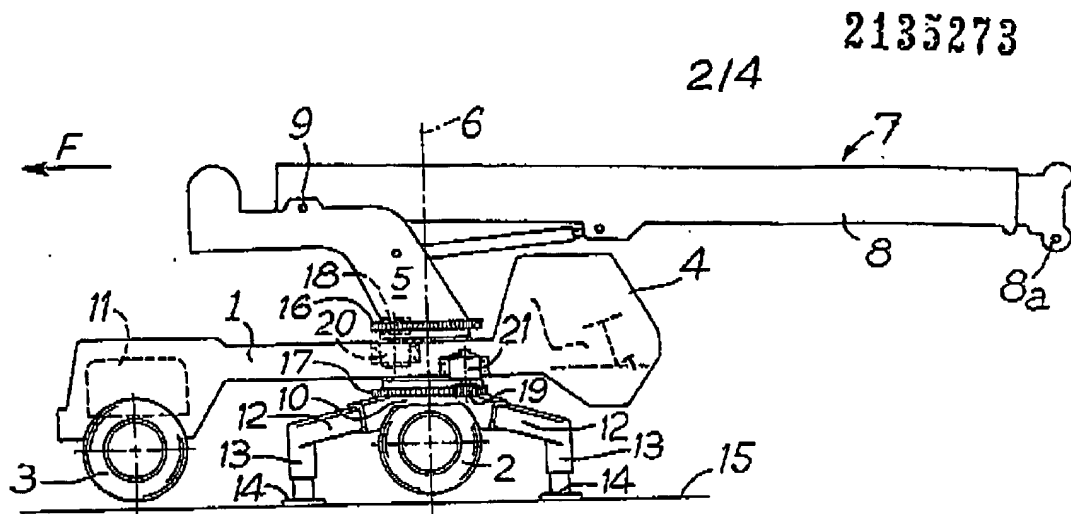


Fig. 3

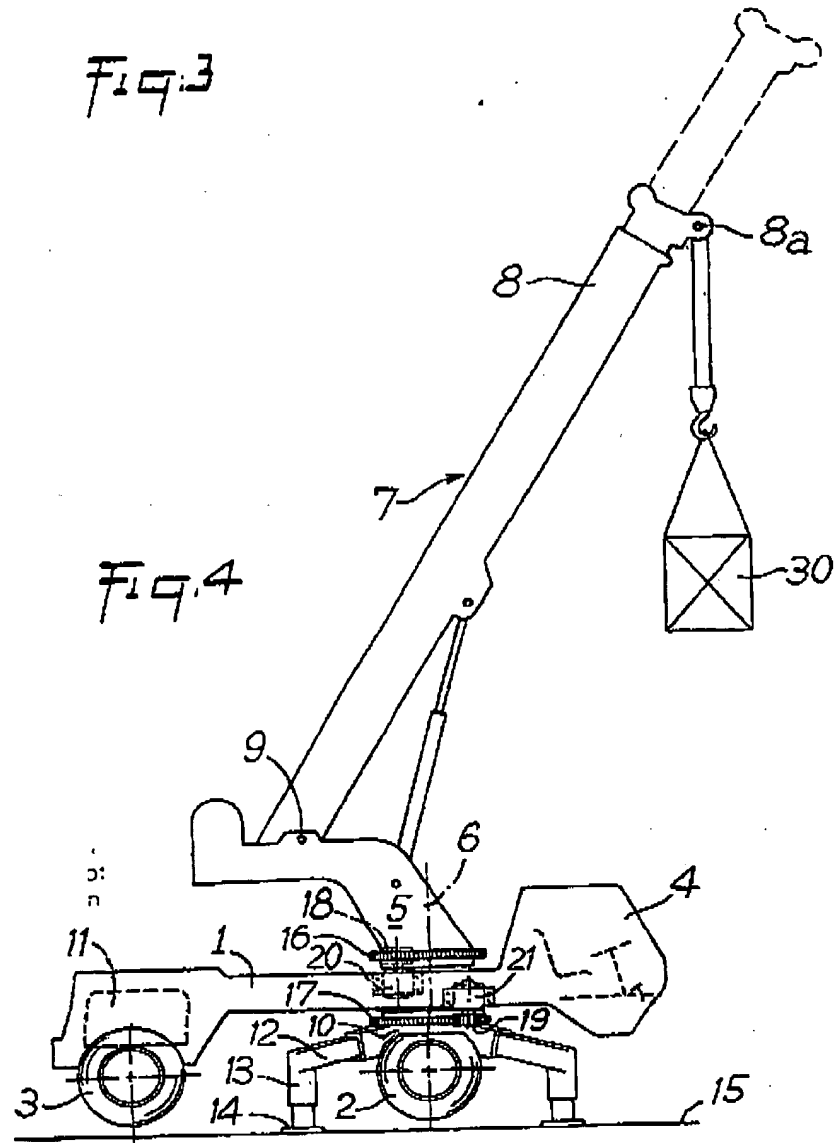


Fig. 4

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Fig. 5

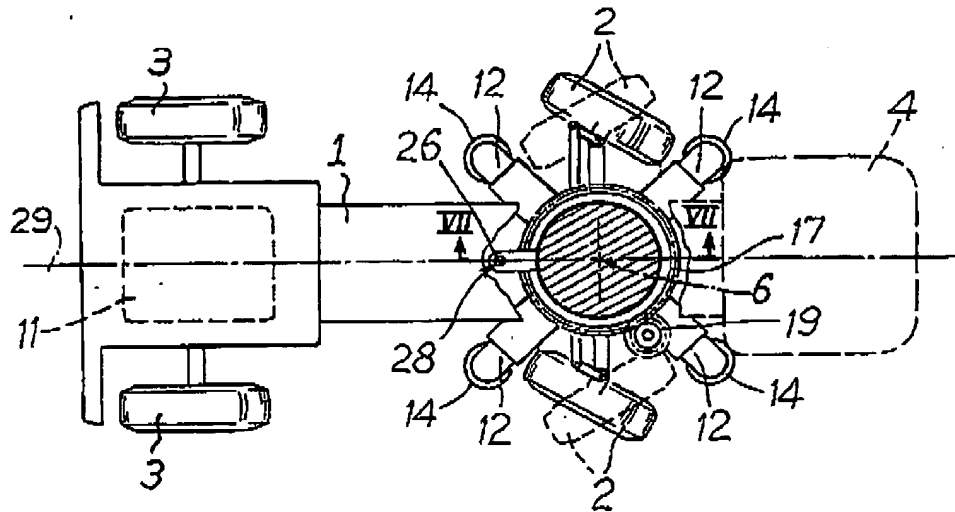
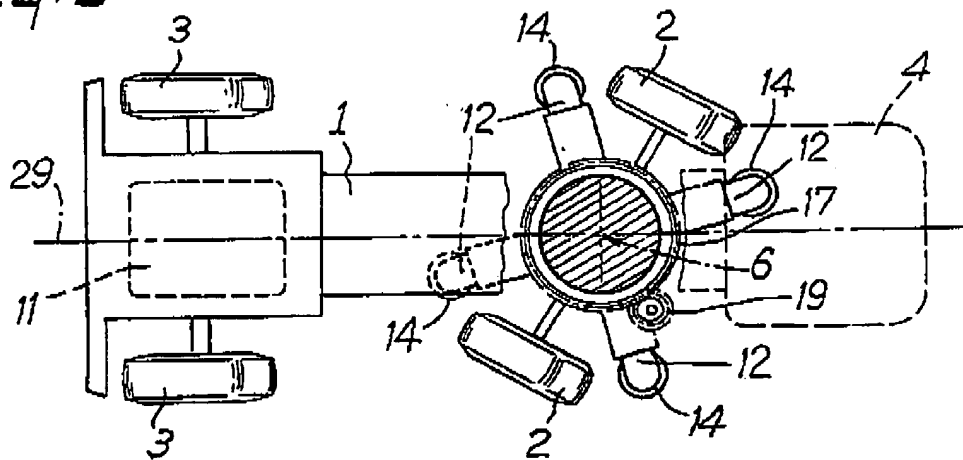


Fig. 6



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Fig. 7

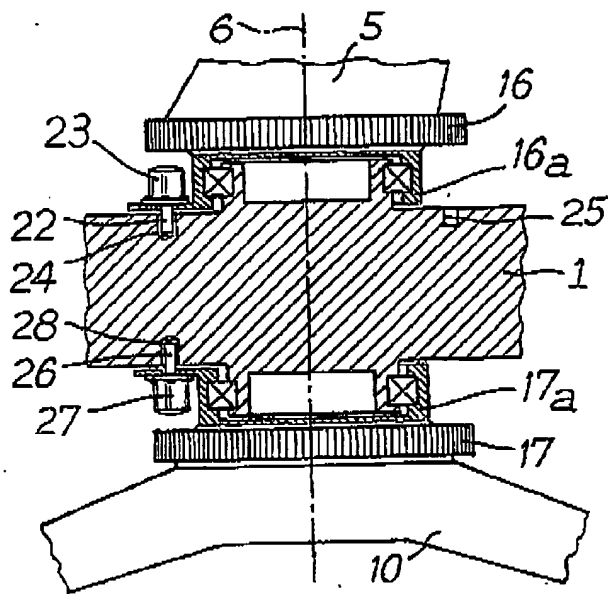


Fig. 8

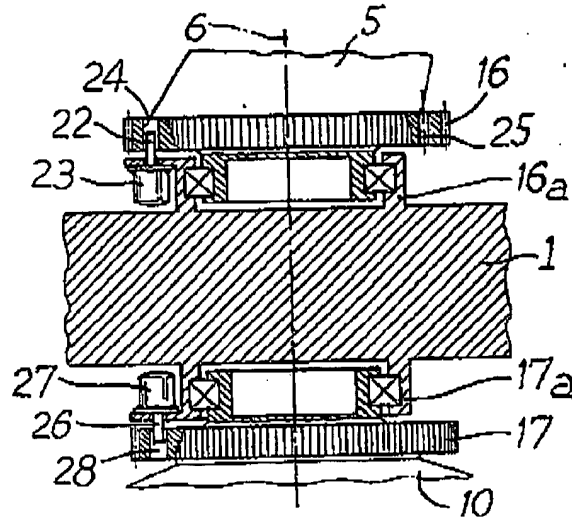
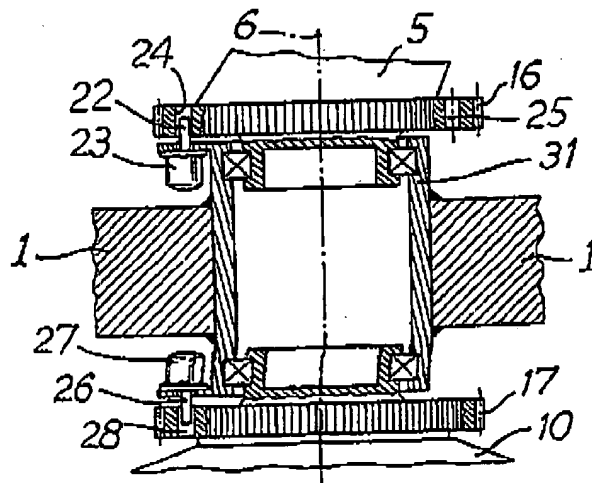


Fig. 9



SPECIFICATION

Mobile machine such as a mobile crane, equipped with turret structure and stabilizing assembly

The present invention relates to mobile machines such as mobile cranes equipped with turret structure and stabilizing assembly.

There are mobile machines such as cranes or excavators, which are designed for road travel.

One necessary condition has to be met, and that is a good stability of the machine on the road, which implies a relatively low centre of gravity.

Such a machine is normally constituted by:

- a chassis equipped with moving members,
- a driver's cab situated on the chassis, in a first longitudinal half of said chassis,
- a turret structure, mounted for rotating on the chassis about a first vertical axis,
- a working assembly consisting of a boom mounted on said turret structure,
- a heavy driving unit mounted on the chassis in the second longitudinal half of said chassis, and
- a stabilizing assembly consisting of arms, by which the machine can rest on the ground, coupled to said chassis.

Another condition to be met is that the heavy mass, situated at the end of the boom, must be at least partly, counter-balanced, to prevent any tipping of the machine. In the known machines, the balance-weight is a completely separate element from the rest of the machine, this resulting in relatively heavy machines, with poor road performances.

Yet, an important weight already exists in the machine, and that is the driving unit: an engine, generally a "Diesel" type engine, hydraulic pumps, etc... It is the object of the present invention to propose a new construction in which this heavy unit will act as balance-weight.

To this effect, the machine of the type described hereinabove is completed, according to the invention, so that:

- a) the stabilizing assembly is mounted for relative rotation, with respect to the chassis, about a second vertical axis,
- b) the machine comprises means of selectively connecting the turret structure with the chassis, which means are capable of immobilizing the turret with respect to the chassis in a first position adapted to driving the machine on the road, wherein the boom is extendable substantially horizontally in a first direction going from the first towards the second longitudinal half of the chassis, and, in a second position adapted to the operation of the working equipment, wherein the boom is extendable substantially horizontally in a second direction, which is opposite to the first direction.

also preferably adopted:

- the means of selectively connecting the turret with the chassis consist in a lug, carried by one of the two elements—chassis and turret—and in two holes provided in the second of said two elements, situated on a circle which constitutes the projection of the circle described by the lug during the relative rotation moving the turret between said first and second positions, said holes being diametrically opposite, and said lug being coupled to a device for controlling its position, which device is capable, when the lug is situated opposite any one of the two holes, to control its introduction therein and removal therefrom.

-the machine comprises front wheels which, are either on the stabilizing assembly and are permanently oriented with respect thereto, or mounted on said stabilizing assembly and orientable with respect thereto, in which latter case, said stabilizing assembly is provided with means of selective connection with the chassis;

-the first and second vertical axes are adjoining, and preferably one single axis;

-first and second directing gear wheels are placed on the one hand between the chassis and the turret, and on the other hand, between the chassis and the stabilizing assembly, respectively, and have entirely separate constituents.

The main advantage resulting from the invention resides essentially in the fact that the weight of the main engine participates in balancing the machine. Machines of this particular design do not need any other balance-weight than said engine; lighter than the prior art machines, their performances, on roads in particular, can be found to be such improved.

Because of the presence, in this novel machine, of a stabilizing assembly mounted on a lower turret structure which is rotatable with respect to the chassis, it is further possible, according to a special embodiment, to use a front wheel assembly of permanent orientation with respect to said lower turret structure, which obviously simplifies the construction.

The invention will be more readily understood on reading the following description with reference to the accompanying drawings in which:

Figure 1 is an elevational view of a mobile crane according to the invention, in a first configuration of use;

Figure 2 is an elevational view of the same crane, in a second configuration of use;

Figure 3 is an elevational view of the same crane, in a third configuration of use;

Figure 4 is an elevational view of the same crane, in a fourth configuration of use;

Figure 5 is a cross-section along line V-V of Figure 1;

Figure 6 is a similar cross-section of a

Figures 7, 8 and 9 are cross-sections along line VII-VII of Fig. 5, of three possible embodiments of the crane according to the invention.

- 5 The mobile crane illustrated in Figs. 1 to 4 comprises:
- a chassis 1, equipped with front drive wheels 2 and back wheels 3,
 - a driver's cab 4, situated at a first end of the chassis 1, in a first half of said chassis,
 - 10 permitting to drive the machine on the road and to move it on a working site,
 - an upper turret structure 5, which is mounted on the top of chassis 1, for rotating about a first vertical axis 6,
 - 15 -a working assembly 7 comprising in particular, a boom 8 mounted for pivoting on said upper turret structure 5 about a horizontal pin 9 disposed crosswise with respect to the longitudinal plane of the machine (parallel to the plane of Figs. 1 to 4),
 - 20 -a lower turret structure 10 mounted for rotating with respect to chassis 1, under said chassis, about a vertical axis 6,
 - 25 -a driving power assembly 11 consisting in particular of an internal combustion engine, of "Diesel" type, hydraulic pumps and hydraulic circuit elements, said assembly 11 being weighty, and placed close to the end of chassis 1 in facing relation to cab 4, in the second half of said chassis,
 - 30 -four telescopic stabilizing arms 12, integral with the lower turret structure 10, provided at their free end with substantially vertical telescopic legs 13, supporting stabilizing plates 14 able to be brought in resting contact against the ground 15, the arms 12 forming a cross,
 - 35 -two directing gear wheels 16, 17 secured to the upper 5 and lower 10 turret structures, and meshing in conventional manner with pinions 18, 19 integral with the output shafts of the driving motors 20, 21 whose bodies are fixed on chassis 1, respectively,
 - 40 -means of selectively connecting the upper turret structure 5 with chassis 1, consisting in a lug 22 coupled to a small hydraulic control jack 23 fixed on one of the two elements-upper turret structure 5 (Fig. 7) or chassis 1
 - 45 (Figs. 8 and 9)-and in two diametrically opposite holes 24, 25 situated on an arc of circle 6, and provided in the (complementary) element: chassis 1 (Fig. 7) or upper turret structure 5 (Figs. 8 and 9), said lug 22 being
 - 50 selectively introduceable in or removable from each of said holes; the introduction of lug 22 into hole 24 corresponding to a first position immobilizing the upper turret structure 4 with respect to the chassis 1, in which position
 - 55 (Figs. 1 and 2), the boom 8 can be placed parallel to the longitudinal plane of the chassis and directed rearwards of the driver's cab 4, in the direction of arrow F, whereas the introduction of lug 22 into hole 25 corresponds to a second position immobilizing the
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upper turret structure 5 with respect to chassis 1, in which position (Fig. 3) the boom 8 can be placed parallel to the longitudinal plane of the chassis and directed in the opposite direction to arrow F,

- 70 -according to the embodiment shown in Fig. 5, means of selectively connecting the lower turret structure 10 with the chassis 1 are also provided and consist in a lug 26
- 75 coupled to a small hydraulic control jack 27 fixed on one of the two elements-lower turret 10 (Fig. 7) or chassis 1 (Figs. 8 and 9)-and by a hole 28 situated on an arc of circle 6, provided in the (complementary) element-chassis 1 (Fig. 7) or lower turret structure 10 (Figs. 8 and 9), hole where said lug 27 can be selectively introduced or removed from, the introduction of lug 27 into hole 28 corresponding to a position immobilizing the
- 80 lower turret structure 10 with respect to chassis 1, in which position the stabilizers arms 12 are disposed symmetrically with respect to the vertical longitudinal plane 29 of the chassis 1. According to this embodiment and in the aforesaid configuration, the front drive wheels 2 are orientable with respect to the lower turret structure 10 between two outermost positions represented in block lines and in broken lines in Fig. 5, said positions being
- 85
- 90 symmetrical with respect to the longitudinal plane 29.
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The following points should be noted:

- the position of the front drive wheels 2 can be different from that shown in Fig. 5 and, for example, be such as shown as a variant in Fig. 6, where the wheels 2 are permanently oriented with respect to the lower turret structure 10 and to the arms 12 secured thereto; according to this variant, it is the assembly formed by lower turret structure 10 and wheels 2 which rotates about vertical axis 6, thus giving to the machine the same possibility of movement as the machine according to Fig. 5; in this configuration of
- 100 course, the means connecting the lower turret 10 with the chassis 1 (lug 26, hole 28) are eliminated, the orientation of the front wheels 2 with respect to the chassis 1 being obtained by rotating said lower turret structure 10 with respect to chassis 1, as shown by the dissymmetry of the position of arms 12 in Fig. 6 with respect to the longitudinal plane 29 of the chassis;
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- in Figs. 1, 5 and 6, the machine rests on the ground 15 via its front wheels 2 and rear wheels 3, the arms 12 and legs 13 being at their shortest possible respective dimensions;
- in Figs. 2, 3 and 4 on the contrary, the machine rests on the ground 15 via stabilizing plates 14, the arms 12 and 13 being telescoped so as to have their largest respective dimensions, and the wheels 2 and 3 being off the ground 15;
- 120
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- in the configuration according to Figs. 1 and 2 the lug 22 is introduced into hole 24
- 130

and immobilizes upper turret structure 5 with respect to chassis 1 so that boom 8, positioned substantially horizontally, is directed to face the rear of the machine (arrow A); in these configurations, the boom 8 and upper turret structure 5 do not in any way affect the front and side visibility of the driver of the machine who is in the cab 4, this obviously helping travel on roads;

10 -the configuration of Fig. 3 is reachable from that shown in Fig. 2 by a simple rotation over 180° of the upper turret structure 5 with respect to the chassis, the boom 8 then extending substantially horizontally towards the front of the machine (i.e. in the opposite direction to arrow A); it is to be noted in this case that the end 8a of the boom 8 is placed with respect to the vertical axis 6 on the side opposite that of driving assembly 11;

20 -thus, the effect of a load 30 (Fig. 4) suspended from end 8a of boom 8 is partly balanced by the weight of assembly 11, this eliminating the need of having to resort to other counter-balancing means; obviously, the same effect occurs when the machine is a hydraulic excavator and when the end of the boom of it is equipped with a bucket filled with excavated materials;

-in the case of Figs. 3 and 4, the upper turret structure 5 is connected to the chassis 1, the resulting assembly being pivotable about vertical axis 6 with respect to the lower turret structure 10, which rests on the ground 15 via plates 14; during any rotation of the upper assembly (1-5-8) with respect to lower turret structure 10, the driving assembly 11, which also acts as a balance-weight, remains on the side opposite to end 8a of the boom 8, and therefore at the opposite end of the load 30;

-the upper turret structure 5 is mounted for rotating about axis 6 with respect to chassis 1; the adequate and necessary amplitude of this rotation is 180° in order to pass from the position illustrated in Fig. 2 to the position illustrated in Fig. 3, and vice-versa;

-in the illustrated embodiments, the axes of relative rotation with respect to chassis 1, of the upper turret structure 5 and lower turret structure 10, are one and the same axis 6; but these axes, as a variant, could be distinct.

It must finally be noted that the toothed wheels 16 and 17 can be mounted according to one of the embodiments of Figs. 7, 8 and 9: in Figs. 7 and 8, each orientation wheel is completely separate from the other, the external element 16a, 17a of each wheel being part of turret structures 5 and 10 in the embodiment of Fig. 7, and part of chassis 1 in the embodiment of Fig. 8; in Fig. 9, the two orientation wheels have a constituting element in common, which, in this case, constitutes their external element 31, integral with chassis 1. The advantage of the solution

65 shown in Figs. 7 and 8 is that it gives the

possibility of using standardized orientation wheels, and not special ones as those shown in Fig. 9, which latter nevertheless lead to saving on the weight.

70 The invention is in no way limited to the description given hereinabove and on the contrary covers any variants that can be brought thereto without departing from its scope or its spirit.

75 CLAIMS

1. A mobile machine, such as a mobile crane, of the type constituted by:
-a chassis equipped with moving members,
80 -a driver's cab situated on the chassis, in a first longitudinal half of said chassis,
-a turret structure, mounted for rotating on the chassis about a first vertical axis,
-a working assembly consisting of a boom
85 mounted on said turret structure;
-a heavy driving unit mounted on the chassis in the second longitudinal half of said chassis, and
-a stabilizing assembly consisting of arms
90 by which the machine can rest on the ground, coupled to said chassis, machine wherein
a) the stabilizing assembly is mounted for relative rotation, with respect to the chassis, about a second vertical axis,
95 b) the machine comprises means of selectively connecting the turret structure with the chassis, which means are capable of immobilizing the turret with respect to the chassis in a first position adapted to driving the machine on the road, in which the boom is extendable substantially horizontally in a first direction going from the first towards the second longitudinal half of the chassis, and, in a second position adapted to the operation of the working equipment, in which the boom is extendable substantially horizontally in a second direction, which is opposite to the first direction.

2. A machine according to claim 1, wherein the means of selectively connecting the turret with the chassis consist in a lug, carried by one of the two elements—chassis and turret—and in two holes provided in the second of said two elements, situated on a circle which constitutes the projection of the circle described by the lug during the relative rotation moving the turret between said first and second positions, said holes being diametrically opposite, and said lug being coupled to a device for controlling its position,
120 which device is capable, when the lug is situated opposite any one of the two holes, to control its introduction therein and removal therefrom.

3. A machine according to claim 1, wherein said machine comprises front wheels which are either mounted on the stabilizing assembly and are permanently oriented with respect thereof.

4. A machine according to claim 1,

120 wherein said machine comprises

which are mounted on the stabilizing assembly and are orientable with respect thereto, whereas said stabilizing assembly is provided with means of selective connection with the chassis.

5 5. A machine according to claim 1, wherein said first and second vertical axes are adjoining, and preferably one single axis.

10 6. A machine according to claim 1, wherein said first and second directing gear wheels are placed on the one hand, between the chassis and the turret, and on the other hand, between the chassis and the stabilizing assembly, respectively, and have entirely separate constituents.

15 7. A machine substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

20 8. A mobile machine comprising a chassis; a driver's cab and a turret situated on the chassis; a working equipment consisting of a boom mounted on said turret; a driving assembly mounted on the chassis; a stabilizing assembly mounted for rotating with respect to the chassis; and means for selectively connecting the turret with the chassis so as to be able to immobilize the turret with respect to the chassis.

25 9. Any novel integer or step, or combination of integers or steps, hereinbefore described and/or as shown in the accompanying drawings, irrespective of whether the present claim is within the scope of or relates to the same or a different invention from that of the preceding claims.

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